

REMARKS

Independent claims 1, 57, and 107 have been amended to recite “at least one gas generant.” Support for the amendment is found in the as-filed application at at least paragraph [0045]. Dependent claims 2-5, 7, 9, 12-16, 22, 27, 28, 34, 36-38, 40, 41, 44-47, 53, 58-65, 69-74, 87-90, 94-106, and 108-114 have been amended to improve antecedent basis.

The claim amendments include amendments to withdrawn claims 87-90 and 94-114, as indicated in the listing of claims by the status identifier “Withdrawn-Currently Amended.” Applicants note that subsection C(E) of M.P.E.P. § 714 lists the status identifier “Withdrawn-Currently Amended” as an acceptable alternative for “Withdrawn.” As such, use of “Withdrawn-Currently Amended” to indicate the amendments to claims 87-90 and 94-114 complies with the current rules of the United States Patent and Trademark Office.

The Office Action mailed March 1, 2007, has been received and reviewed. Claims 1-5, 7-16, 18-67, 69-90 and 94-114 are currently pending in the application, of which claims 1-5, 7-16, 18-28, 31-65 and 69-78 are currently under examination. Claims 29, 30, 66, 67, 79-90 and 94-114 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1-5, 7-16, 18-28, 31-65 and 69-78 stand rejected. Applicants have amended claims 1-5, 7, 9, 12-16, 22, 27, 28, 34, 36-38, 40, 41, 44-47, 53, 57-65, 69-74, 87-90, and 94-114, and respectfully request reconsideration of the application as amended herein.

Telephone Conference with the Examiner

Applicants appreciate the telephone conference with the Examiner on April 20, 2007, during which the Examiner’s reliance on U.S. Patent No. 6,019,177 to Olander (“Olander”) in the outstanding obviousness rejections was discussed. In addition, the Examiner’s search strategy in his attempt to find a prior art reference that suggests a gas generant that produces a gas mixture substantially free of carbon-containing gases upon combustion was discussed. Based on the conversation between the Examiner and Applicants, it was apparent that no such reference has been found to date. Verbal resolution regarding the allowability of the claims was not reached during the telephone conference. Therefore, per the Examiner’s request, Applicants

submit herein a formal response to the outstanding rejections.

Election of Species Requirement

In the Office Action Summary, the Examiner indicates that claims 29, 30, 66, 67, 79-90 and 94-114 are withdrawn from consideration.

As detailed in Applicants' responses filed on March, 24, 2006, and August 14, 2006, the Election of Species Requirement regarding claims 29, 30, and 83-90 should be withdrawn. Since arguments for withdrawing the species election of these claims were provided in the above-mentioned responses, the arguments are not repeated herein. While the Examiner withdrew the species election of claims 26-28 and 31-56 in the Office Action dated November 17, 2006, the Examiner did not withdraw the species election of claims 29, 30, and 83-90. However, the Examiner also did not provide any reasons for maintaining the species election of these claims. Therefore, Applicants are unclear of the reasons for the withdrawal of claims 29, 30, and 83-90.

In regard to claims 66 and 67, the Examiner indicates that these claims are withdrawn as being identical to withdrawn claims 29 and 30, respectively. However, Applicants note that claims 66 and 67 are not identical to claims 29 and 30 because the former claims recite method-like limitations while the latter claims recite composition of matter-like limitations. In addition, since the Examiner has not provided any reasons for maintaining the species election of claims 29 and 30, Applicants are unclear of the reasons for withdrawing claims 66 and 67.

In regard to claims 79-82, these claims were pending in the previous Office Action (mailed November 17, 2006). Since the instant Office Action does not provide reasons for withdrawing these claims, Applicants are unclear of the reasons for withdrawal of these claims.

The Examiner also indicates that newly submitted claims 94-114 are withdrawn from consideration as being directed to a non-elected invention. However, claims 94-100 depend directly or indirectly on claim 1 and, therefore, are allowable, *inter alia*, as depending from an allowable base claim. In addition, claims 101-106 depend directly on claim 57 and, therefore, are allowable, *inter alia*, as depending from an allowable base claim. Therefore, contrary to the Examiner's assertion, claims 94-106 are not directed to a non-elected invention.

Claims 107-114 are also not directed to a non-elected invention because these claims are

directed to a fire suppression system, as are pending claims 1-5, 7-16, 18-56, and 79-86.

As a result, claims 1-5, 7-16, 18-67, 69-90, and 94-114 should be under consideration.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,116,348 to Drakin in view of Olander

Claims 1-5, 7-10, 13, 14, 18, 22-25, 57, 58, 60-65, 69, 72-75, 77, and 78 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,116,348 to Drakin (“Drakin”) in view of Olander. Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for an obviousness rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The obviousness rejection of claims 1-5, 7-10, 13, 14, 18, 22-25, 57, 58, 60-65, 69, 72-75, 77, and 78 is improper because the cited references do not teach or suggest all of the claim limitations.

Drakin suggests a device for extinguishing a fire that includes a pyrotechnic composition. Drakin at column 1, lines 5-10. Upon ignition, the pyrotechnic composition produces a gas and aerosol mixture that includes hydrogen, oxygen, ammonia, and carbon-containing gases, such as carbon monoxide (“CO”) and methane (“CH₄”). *Id.* at column 4, lines 1-21 and Table 1. The pyrotechnic compositions include carbon-containing ingredients, such as dicyaneamide, phenol formaldehyde resins, epoxy resins, and ballistite powder (nitrocellulose and nitroglycerin). *Id.* at Table 1. The gas and aerosol mixture is passed through an oxygen-containing oxidizer, which decomposes to oxygen. *Id.* The oxygen reacts with the gas and aerosol mixture and

incompletely oxidized combustion products to produce carbon dioxide (“CO₂”), water (“H₂O”), and nitrogen (“N₂”). *Id.* The gas and aerosol mixture is cooled using a solid coolant. *Id.* at column 4, lines 31-32.

Olander suggests a flame suppression composition including an inorganic halogen-containing component and an organic binder system. Olander at the Abstract. When combusted, the flame suppression composition produces gaseous reaction products that include carbon monoxide. *Id.* at column 8, lines 46-58.

The cited references do not teach or suggest all of the limitations of independent claim 1 because Drakin and Olander, alone or in combination, do not teach or suggest the limitation of “a gas generant formulated to pyrotechnically produce an inert gas mixture substantially free of carbon-containing gases.” As acknowledged by the Examiner, Drakin does not teach or suggest this limitation. Office Action of March 1, 2007, p. 3. The Examiner relies on Olander as teaching this limitation and states that “Olander ‘177 teaches a method of fire suppression comprising the use of halogen which is free of carbon-containing gases for safety and to reduce the effects on the environment.” *Id.* However, Applicants respectfully disagree with the Examiner’s statement because Olander explicitly states that carbon monoxide is produced upon combustion of its flame suppression composition. Since carbon monoxide is a carbon-containing gas, Olander does not cure the above-mentioned deficiencies in Drakin.

Since the cited references do not teach or suggest all of the limitations of claim 1, the obviousness rejection is improper and should be withdrawn.

Dependent claims 2-5, 7-10, 13, 14, 18, and 22-25 are allowable, *inter alia*, as depending from an allowable base claim.

Claim 5 is further allowable because Drakin and Olander do not teach or suggest that the gas generant is formulated to produce minimal amounts of carbon monoxide, particulates, or smoke when combusted.

Claim 7 is further allowable because Drakin and Olander do not teach or suggest that the gas generant is formulated to produce less than 1 percent of an original weight of the gas generant in particulates or smoke.

Claim 8 is further allowable because Drakin and Olander do not teach or suggest that

substantially all of the at least one gaseous combustion product forms the inert gas mixture.

Claim 9 is further allowable because Drakin and Olander do not teach or suggest that the at least one solid combustion product is formulated to minimize production of particulates during combustion of the gas generant.

Claim 10 is further allowable because Drakin and Olander do not teach or suggest that the at least one solid combustion product is a slag.

Claim 13 is further allowable because Drakin and Olander do not teach or suggest that the gas generant is formed into a geometry that provides a neutral burn when combusted.

The cited references also do not teach or suggest all of the limitations of independent claim 57 because Drakin and Olander, alone or in combination, do not teach or suggest the limitation of “igniting a gas generant to produce an inert gas mixture substantially free of carbon-containing gases and comprising minimal amounts of particulates or smoke when combusted” for substantially the same reasons as discussed above for claim 1. Drakin does not teach or suggest this limitation, as acknowledged by the Examiner. Office Action of March 1, 2007, p. 3. Olander also does not teach or suggest this limitation because its flame suppression composition produces carbon monoxide, a carbon-containing gas, upon combustion.

Since the cited references do not teach or suggest all of the limitations of claim 57, the obviousness rejection is improper and should be withdrawn.

Dependent claims 58, 60-65, 69, 72-75, 77, and 78 are allowable, *inter alia*, as depending from an allowable base claim.

Obviousness Rejection Based on Drakin in view of Olander and in further view of U.S. Patent No. 6,474,684 to Ludwig *et al.*

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of U.S. Patent No. 6,474,684 to Ludwig *et al.* (“Ludwig”). Applicants respectfully traverse this rejection, as hereinafter set forth.

Ludwig suggests a dual stage inflator for use in an air bag. Ludwig at the Abstract. The inflator includes a pressure vessel and a gas generator that produces a sufficient amount of a non-toxic, non-noxious gaseous product to inflate an airbag. *Id.* at column 5, line 60 through column

6, line 3. The gaseous product flows into and inflates the air bag. *Id.* at column 13, lines 33-35. The gas generator is ignited using an auto-ignition powder or ignition-enhancing material or charge. *Id.* at column 6, lines 58-61, column 7, lines 59-63, and column 11, lines 22-59. When ignited, the auto-ignition powder or ignition-enhancing material provides sufficient heat and pressure to ignite the gas generator. *Id.* at column 11, lines 22-28.

Claim 11 is allowable, *inter alia*, as depending from an allowable base claim.

In addition, the obviousness rejection of claim 11 is improper because the cited references do not teach or suggest all of the limitations of this claim. Specifically, Drakin, Olander, and Ludwig, alone or in combination, do not teach or suggest the limitation of “wherein the inert gas mixture comprises nitrogen and water.” The Examiner relies on column 12, line 27 of Ludwig as teaching this limitation. Office Action of March 1, 2007, p. 3. However, Applicants’ review of the cited section of Ludwig does not support the Examiner’s position. Instead, the cited section of Ludwig discusses pressing a gas generant charge into a pellet, tablet, or other form.

Drakin, Olander, and Ludwig, alone or in combination, also do not teach or suggest the limitation of “a gas generant formulated to pyrotechnically produce an inert gas mixture substantially free of carbon-containing gases.” Since claim 11 depends from claim 1, claim 11 includes this limitation of claim 1. Ludwig does not cure the above-mentioned deficiencies in Drakin and Olander and, therefore, does not teach or suggest the above-mentioned limitation.

Since the cited references do not teach or suggest all of limitations of claim 11, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of U.S. Patent No. 6,093,269 to Lundstrom *et al.*

Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of U.S. Patent No. 6,093,269 to Lundstrom *et al.* (“Lundstrom”). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 12 is allowable, *inter alia*, as depending from an allowable base claim.

Since the cited references do not teach or suggest all of limitations of claim 12, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of U.S. Patent No. 5,538,568 to Taylor *et al.* and U.S. Patent No. 5,882,036 to Moore *et al.*

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of U.S. Patent No. 5,538,568 to Taylor *et al.* (“Taylor”) and U.S. Patent No. 5,882,036 to Moore *et al.* (“Moore”). Applicants respectfully traverse this rejection, as hereinafter set forth.

Taylor suggests a hybrid gas generating system that includes an extrudable gas generant having an oxidizer and a thermosettable resin. Taylor at column 1, lines 12-17 and column 2, lines 56-67. The thermosettable resin is an acrylate-terminated polybutadiene, a hydroxy-terminated polybutadiene/diisocyanate reaction product, an ester of a polybutadiene polycarboxylic acid and an epoxy modified polybutadiene and/or a hydroxyl-terminated polybutadiene, and a styrene/polyester copolymer. *Id.* at column 3, lines 17-28. CO₂ and H₂O are produced upon combustion. *Id.* at column 5, lines 42-45. The gas generant also includes titanium dioxide and cupric oxide. *Id.* at column 5, lines 57-60 and column 6, lines 8-11.

Moore suggests an inflator that includes a gas generant. Moore at the Abstract. The gas generant includes hexa amminecobalt(III) trinitrate (“HACN”), basic copper nitrate, and guar gum or HACN, basic copper nitrate, guanidine nitrate, and guar gum. *Id.* at column 6, lines 23-36.

Claim 15 is allowable, *inter alia*, as depending from an allowable base claim.

In addition, claim 15 is allowable because the cited references, alone or in combination, do not teach or suggest all of the claim limitations. Since claim 15 depends from claim 1, claim 15 includes all of the limitations of claim 1. However, Taylor and Moore do not cure the above-mentioned deficiencies in Drakin and Olander and, therefore, do not teach or suggest the limitation of “a gas generant formulated to pyrotechnically produce an inert gas mixture substantially free of carbon-containing gases.” As discussed in Taylor, the gas generant produces CO₂, a carbon-containing gas, when combusted. Similarly, since the gas generant of Moore includes guar gum (a carbon-containing compound), the gas generant produces a carbon-containing gas when combusted.

Since the cited references do not teach or suggest all of limitations of claim 15, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Taylor and U.S. Patent No. 6,481,746 to Hinshaw *et al.*

Claim 16 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Taylor and U.S. Patent No. 6,481,746 to Hinshaw *et al.* (“Hinshaw”). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 16 is allowable, *inter alia*, as depending from an allowable base claim.

Since the cited references do not teach or suggest all of limitations of claim 16, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of U.S. Patent No. 5,739,460 to Knowlton *et al.*

Claims 19-21 and 76 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of U.S. Patent No. 5,739,460 to Knowlton *et al.* (“Knowlton”). Applicants respectfully traverse this rejection, as hereinafter set forth.

Knowlton suggests an autoignition composition used to ignite a gas generator composition. Knowlton at the Abstract. The autoignition composition includes an oxidizer and a powdered metal. *Id.* at column 2, lines 44-55. The oxidizer includes lithium nitrate, sodium nitrate, or potassium nitrate. *Id.*

Claims 19-21 are allowable, *inter alia*, as depending from an allowable base claim, namely claim 1. Claim 76 is allowable, *inter alia*, as depending from an allowable base claim, namely claim 57.

In addition, the cited references do not teach or suggest all of the limitations of claims 19-21 and 76 because the cited references, alone or in combination, do not teach or suggest a heat management system that comprises a phase change material (claim 19) or flowing the inert gas mixture over a phase change material (claim 76). Since the cited references do not teach or suggest a phase change material, the cited references necessarily do not teach or suggest that the

phase change material in the heat management system comprises lithium nitrate, sodium nitrate, potassium nitrate, or mixtures thereof (claim 20) or that the fire suppression system is configured to transfer heat from the inert gas mixture to the phase change material (claim 21).

While Knowlton suggests lithium nitrate, sodium nitrate, or potassium nitrate are present in an autoignition composition, Knowlton does not teach or suggest that these components are present in a “heat management system positioned and configured to reduce a temperature of the inert gas mixture,” as recited in claim 1, upon which claims 19-21 directly or indirectly depend. Rather, the autoignition composition of Knowlton produces heat to initiate combustion of the gas generator composition of Knowlton. Similarly, claim 76 depends from claim 74, which recites “exposing the inert gas mixture to a heat management system.”

Since the cited references do not teach or suggest all of limitations of claims 19-21 and 76, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on U.S. Patent No. 6,116,348 to Drakin in view of U.S. Patent No. 6,019,177 to Olander

Claims 26-28, 31-42, 45, 48, 49, and 53-56 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 26-28, 31-42, 45, 48, 49, and 53-56 are allowable, *inter alia*, as depending from an allowable base claim.

Since the cited references do not teach or suggest all of limitations of claims 26-28, 31-42, 45, 48, 49, and 53-56, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Ludwig

Claims 43 and 59 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Ludwig. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 43 and 59 are allowable, *inter alia*, as depending from allowable base claims, namely claims 1 and 57, respectively.

In addition, the cited references do not teach or suggest all of the claim limitations. Specifically, Drakin, Olander, and Ludwig, alone or in combination, do not teach or suggest the limitation of “wherein the inert gas mixture comprises nitrogen and water,” for substantially the same reasons as described above for claim 11. Drakin, Olander, and Ludwig, alone or in combination, also do not teach or suggest the limitation of “a gas generant formulated to pyrotechnically produce an inert gas mixture substantially free of carbon-containing gases,” for substantially the same reasons as described above for claims 1 and 11.

Since the cited references do not teach or suggest all of limitations of claims 43 and 59, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Lundstrom

Claim 44 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Lundstrom. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 44 is allowable, *inter alia*, as depending from an allowable base claim.

Since the cited references do not teach or suggest all of limitations of claim 44, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Taylor and Moore

Claims 46 and 70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Taylor, and Moore. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 46 and 70 are allowable, *inter alia*, as depending from allowable base claims, namely claims 1 and 57, respectively.

In addition, claims 46 and 70 are allowable because Drakin, Olander, Taylor, and Moore, alone or in combination, do not teach or suggest all of the limitations of claims 46 and 70 for substantially the same reasons as described above for claim 15.

Since the cited references do not teach or suggest all of limitations of claims 46 and 70,

the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Taylor and Hinshaw

Claims 47 and 71 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Taylor and Hinshaw. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 47 and 71 are allowable, *inter alia*, as depending from allowable base claims, namely claims 1 and 57, respectively.

Since the cited references do not teach or suggest all of limitations of claims 47 and 71, the obviousness rejection is improper and should be withdrawn.

Obviousness Rejection Based on Drakin in view of Olander and in further view of Knowlton

Claims 50-52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drakin in view of Olander and in further view of Knowlton. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 50-52 are allowable, *inter alia*, as depending directly or indirectly from an allowable base claim, namely claim 1.

In addition, claims 50-52 are allowable because Drakin, Olander, and Knowlton, alone or in combination, do not teach or suggest all of the limitations of claims 50-52 for substantially the same reasons as described above for claims 19-21.

Since the cited references do not teach or suggest all of limitations of claims 50-52, the obviousness rejection is improper and should be withdrawn.

ENTRY OF AMENDMENTS

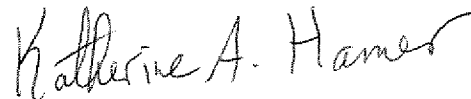
The amendments to claims 1-5, 7, 9, 12-16, 22, 27, 28, 34, 36-38, 40, 41, 44-47, 53, 57-65, 69-74, 87-90, and 94-114 should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add new matter to the application.

Applicants consider claims 1, 57, and 107 to be generic, and note that upon allowance of a generic claim, claims depending therefrom in a non-elected species would also be allowable.

CONCLUSION

Claims 1-5, 7-16, 18-67, 69-90, and 94-114 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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